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POLICY BRIEF

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Enhancing agricultural production and productivity in Uganda through irrigation

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Key messages

- *Despite Uganda being endowed with water resources which could be harvested for agricultural production, most farmers in the country rely on rain-fed agriculture due to limited access to irrigation based water sources. The limited use of irrigation practices limits potential crop and livestock output.*
- *Inability to exploit available water resources perpetuate food insecurity, rural poverty, unemployment and the perception that investing in agriculture is a risky business.*
- *Provision and adoption of irrigation practices can enhance agricultural production and productivity consequently spurring economic growth. Specifically, irrigation boosts returns on inputs like labour, capital, land and management.*
- *Efficient use of water for supplemental irrigation will increase agricultural production*
- *Although the policy, institutional and budgeting frameworks for water for production are in place in Uganda, efforts need to be directed at securing more financing, improving institutional coordination and active promotion of irrigation.*
- *To enhance access to sustainable irrigation for smallholders, it is recommended that the government should construct medium sized dams (e.g. valley dams) and invite the private sector to be involved in water pumping and distribution to farmers at a fee. Government should also strengthen the existing institutional framework to effectively and efficiently manage irrigation development.*

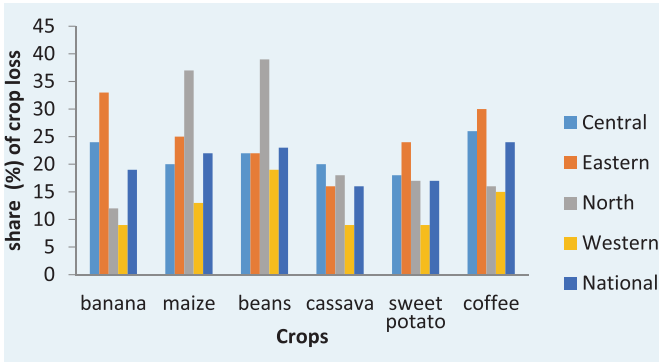
Introduction

Although Uganda has a high agricultural potential due to its favourable climatic and soil characteristics[i], frequent episodes of droughts and famine have affected agricultural yields. Indeed, recent droughts have been associated with decline and in some instances stagnation of the country's agricultural production[ii]. In this policy brief, we examine Uganda's prospects for enhancing agricultural productivity through irrigation.

Losses at household level

A critical review of existing households' survey on factors constraining agricultural production shows farmers reporting high levels of expected crop yield loss due to drought. The losses are reported across the major crops and regions as shown in Figure 1. In Figure 1, it is observed that at a national level, farmers lose more than 20 percent of expected yields of banana, maize, beans and coffee. Losses of beyond 30 percent of ex-

Figure 1: Crop loss reported by farmers due to drought in the first season in 2005



Source. Author calculation based on National Household Survey 2005/6

pected yields were reported for maize and beans in the North, banana and coffee in Eastern and coffee in Central.

The reported losses only account for the proportion farmers are able to estimate. Farmers' comparison of output loss is based on their best achieved production, which is always less than optimal[iii]. In this case the real potential for agricultural production is unknown as farmers have adopted cropping patterns, technologies and management practices that suit climatic factors as represented by agro-ecological zones.[1] The country has one or two agricultural production seasons as influenced by rainfall patterns. Overcoming constraints to rainfed production will allow farmers to increase output and diversify to more crops. Moreover, the prevailing cropping pattern is more focussed on ensuring that crops survive without due consideration of the growth stage when a crop require sufficient water for optimal yields. Experimental results show a decrease in yield of about 600 percent if a crop is provided with sufficient water to survive but is deprived extra water it needs for flowering and seeding.[iv]

Differences in crop yields and margin under irrigation and rainfed systems

Table 1 uses a case of maize and bean to highlight the differences in yields and gross margins under irrigation and rainfed agriculture for one of Uganda's neighbours—Tanzania. Largely it is noted that both crop yields and gross margins are remarkably higher under irrigation than rainfed system. Yields for maize and bean increased by 131 and 145 percent respectively, for irrigated crops compared to rainfed system. Gross margin for irrigated maize and bean were US149 and US$ 296 higher respectively, than those of rainfed system.

Table 1. Crops' yields and gross margins differences between rainfed and irrigated systems in Tanzania

Crop/system	Yields (kg/ha)	Break-even yield (kg/ha)	Gross margin (US$/ha)
Maize (rainfed)	1100	728	56
Maize (irrigated)	2550	1185	205
Bean (rainfed)	400	220	116
Bean (irrigated)	980	335	413

Source: FAO and World Bank (1997) Irrigation Technology Transfer in Support of Food Security: FAO Water Report No. 14

1 A land resource mapping unit, defined in terms of climate, landform and soil and having range of potential and constraints for land use

Losses at national level

At national level, incidences of drought and either early or late onset of rainfall have been shown to affect economic growth as measured by gross domestic product (GDP). Table 2 shows the damages and losses experienced among various economic sectors in 2010 due to unexpected onset and cessation of rains in Uganda. Although amount of rainfall received was more than the long-term average in most parts of the country, its unexpected timing disrupted economic activities leading to damages and losses estimated at Uganda Shillings (UGX) 2.8 trillion (US$1.2 billion), translating to about 8 percent of the country's GDP. All the sectors of the economy were hard hit by the erratic rains, but agriculture and its associated sub-sectors (crops, livestock and agro-industry) were hit hardest. Damages and losses in the agricultural sector accounted for about 87 percent of total reported losses. Agricultural losses and damages are due to drying of crops and livestock starving to death as shown in picture 1.

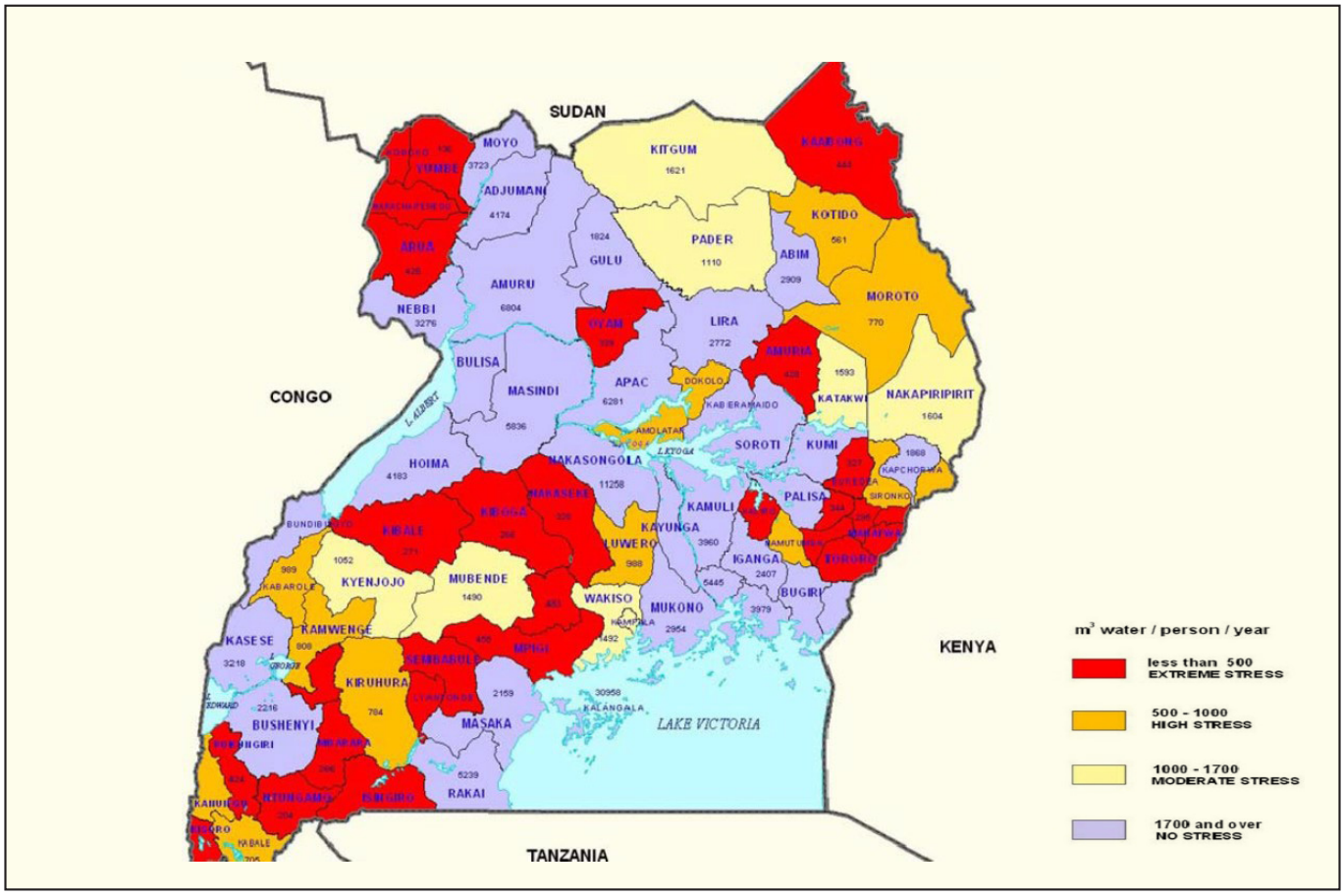
Table 2. Losses to Uganda economy associated with unexpected rainfall patterns in 2010

	Damages and losses in US$ Millions			
Sector	***Damages***	***Losses***	***Total***	***Proportion of loss (%)***
Crops		434.3	434.3	37
Livestock	44.6	428.2	472.8	40
Agro-industry		116.7	116.7	10
Commerce		71.3	71.3	6
Electricity		44.6	44.6	4
Water		0.8	0.8	0
Health		6.3	6.3	1
Education		20.4	20.4	2
Food Aid		7.1	7.1	1
Total		1,129.5	1,174.1	

Source: Office of Prime Minister, 2013 The 2010–2011 Integrated Rainfall Variability Impacts, Needs Assessment and Drought Risk Management Strategy, Kampala.

Picture 1: Livestock and crop losses due to drought

Figure 3 Status of water resources availability in Uganda's districts in 2008



Source: Ministry of Water and Environment, 2008 Strategic Sector Investment Plan for the Water and Sanitation Sector in Uganda. MoWE, Kampala

Opportunities for irrigation in Uganda

Despite the higher losses associated with drought in Uganda, the country has sufficient water resources and a largely flat terrain that allows adoption of irrigation. The opportunities presented by both availability of water resource and terrain are yet to be harnessed for irrigation. Less than two percent of available water, estimated at 64,282m3 per annum per capita, is utilized[v] and eleven percent of irrigable land is developed[vi]. Figure 3 shows status of water resources availability in the country. Most parts of the country are endowed with sufficient water resources (no or moderately water stressed) for exploitation for agriculture. However, what is missing is infrastructure to facilitate irrigation and awareness creation among farmers to facilitate adoption of irrigation.

Achievement

Already the government has developed the policy and institutional framework necessary for water for production and irrigation uses. Various ministries concerned with water utilization and agriculture have put in place strategies, where they have outlined the budget and activities necessary for development of irrigation. Funding agencies including government and development partners have shown interest in the intervention. Efforts by government and other development partners are mostly directly towards micro-dams (farmers individually owned) and large irrigation schemes.

Way forward

Despite the increasing budgets for development of infrastructure that facilitates irrigation, more interventions are necessarily before the country meets its irrigation potential. There is need for continued investment in water for production facilities through financing by both the private and public sectors. To reveal opportunities for irrigation, it is important to estimate the real losses from drought by specific regions with the biological complexity of crops well incorporated

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into the estimation procedure. More research is required on how the crop yields' respond to irrigation together with improved seeds and fertilizer rates. It is necessary to show stakeholders the increased levels of production and productivity that is achievable with irrigation and other technology mix. To increase efficiency in operations, the concerned ministries of Agriculture Animal Industry and Fisheries (MAAIF) and Water and Environment (MoWE) and other stakeholders need to work collectively. Irrigation is a complex endeavor that require a well-coordinated operations to improve on effectiveness during investment and efficiency in operating the irrigation system[vii]. Furthermore existing institutional framework should be strengthened to advocate, promote, develop, regulate, supervise, maintain and research on efficient use of water for supplemental irrigation. Efforts should be made in building the capacity of local governments on investment in small infrastructure for supplemental irrigation. Development of other agricultural production supportive value chains including extension, input provision, produce marketing, value-addition, credit availability and access roads is essential for increasing returns from irrigation. Lastly, it is necessary to develop a sustainable irrigation system that will provide a large number of smallholders access to water when it is required.

Conclusion and policy recommendation

Without supplemental irrigation, Uganda's agro-ecosystems limit agricultural production. Adoption of irrigation is critical for enhancing production and productivity and hence economic growth. Opportunities for adoption of irrigation are presented by availability of water resources, facilitative terrain and policy and institutional environment. However, successful adoption of irrigation will require increased financing, enhanced coordination of government and non-government agencies, and development of irrigation technologies and their dissemination. Establishment of a statutory institution targeting irrigation development is a necessity. A public-private partnership where government construct many medium-sized dams (valley dams) and invite private actors to pump and distribute water to farmers at a fee is recommended. Youths and other investors are encouraged to buy water lifting and pumping facilities and use them to offer services of pumping and distributing water to farmers at fee from the many water bodies in the country.

Endnotes

i NEMA (2009) Uganda Atlas of Our Changing Environment, UNEP, Nairobi, Kenya
ii Office of Prime Minister (2012) The 2010–2011 Integrated Rainfall Variability Impacts, Needs Assessment and Drought Risk Management Strategy. Department of Disaster Management, OPM, Kampala, Uganda.
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